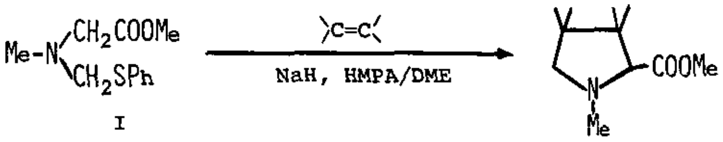
HETEROCYCLES, Vol. 21, No 2, 1984

NOVEL BASE-CATALYZED 1,3-DIPOLAR CYCLOADDITION LEADING TO PYRROLIDINES FROM N-(PHENYLTHIOMETHYL)AMINO ACIDS

Nobuyuki Imai, Yoshiyasu Terao, Kazuo Achiwa, and Minoru Sekiya
Shizuoka College of Pharmacy, 2-2-1 Oshika, Shizuoka 422, Japan

Esters of N-(phenylthiomethyl)amino acids, representatively N-(phenylthiomethyl)sarcosine methyl ester, have been found to undergo a new base-catalyzed 1,3-dipolar cycloaddition with olefinic dipolarophiles to give pyrrolidines. This cycloaddition may involve an intermediary nonstabilized iminium ylides, 1,3-dipole, formed by deprotonation at α to carboalkoxy group and leave of phenyl sulfide anion.



(yield, 40-80%)

$>C=C<$: $H_2C=CHCOOMe$, $MeOOCCH=CHCOOMe$, $MeCH=CHCOOMe$,
$PhCH=CHCOOMe$, $PhCH=C(COOMe)_2$

The reaction smoothly proceeded at room temperature by the use of sodium hydride as a base and hexamethyl phosphoramide-dimethoxyethane as a solvent. Orientation of the cycloaddition and stereochemistry of the products will be discussed.

Extensive experiments using other amino acid derivatives permit ready synthesis of various pyrrolidines in good yields.

Application of this reaction to efficient synthesis of pyrrolizidines is also realized by carring out double cycloaddition using N,N-bis(phenylthiomethyl)-glycine methyl ester.